TBC-41 Board PID Control

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Power
90-250 VAC, 47-63 Hz, 12VA, 5W max.
11-26 VAC / VDC, SELV, Limited Energy, 12VA, 5W max.

Input
Resolution: 18 bits
Sampling Rate: 5 samples/second
Max. Rating: -2 VDC min, 12 VDC max.
(1 minute for mA input)
Temperature Effect: ±1.5uV/ °C for all inputs except mA
±3.0uV/ °C for mA input
Sensor Lead Resistance Effect:
T/C: 0.2uV/ohm
3-wire RTD: 2.6°C/ohm of resistance difference of two leads
2-wire RTD: 2.6°C/ohm of resistance sum of two leads
Burn-out Current: 200 nA
Common Mode Rejection Ratio (CMRR): 120dB
Normal Mode Rejection Ratio (NMRR): 55dB
Sensor Break Detection:
Sensor open for TC, RTD and mV inputs
Sensor short for RTD input
Below 1 mA for 4-20 mA input
Below 0.25V for 1-5 V input
Unavailable for other inputs
Sensor Break Responding Time:
Within 4 seconds for TC, RTD and mV inputs
0.1 second for 4-20 mA and 1-5 V inputs

Output 1 / Output 2
Relay Rating: 2A/240 VAC, life cycles 200,000 for resistive load
Pulsed Voltage: Source Voltage 5V
current limiting resistance 66Ω

Linear Output
Resolution:15 bits
Output Regulation: 0.02% for full load change
Output Settling Time: 0.1 sec. (stable to 99.9%)
Isolation Breakdown Voltage: 1000 VAC
Temperature Effect: ±0.01% of SPAN / °C

Triac (SSR) Output
Rating: 1A / 240 VAC
Inrush Current: 20A for 1 cycle
Min. Load Current: 50 mA rms
Max. Off-state Leakage: 3 mA rms
Max. On-state Voltage: 1.5 V rms
Insulation Resistance: 1000 Mohms min. at 500 VDC
Dielectric Strength: 2500 VAC for 1 minute

Alarm
Alarm Relay: Form C Rating
2A/240VAC, life cycles 200,000 for resistive load
Alarm Functions: Dwell timer, Deviation High / Low Alarm
Deviation Band High / Low Alarm
PV High / Low Alarm
Alarm Mode: Normal, Latching, Hold, Latching / Hold
Dwell Timer: 0.1-4553.6 minutes

Data Communication
Interface: RS-232 (1 unit), RS-485 (up to 247 units)
Protocol: Modbus Protocol RTU mode
Address: 1-247
Baud Rate: 2.4~38.4 Kbits/sec
Data Bits: 7 or 8 bits
Parity Bit: None, Even or Odd
Stop Bit: 1 or 2 bits
Communication Buffer: 160 bytes

Analog Retransmission
Output Signal: 4-20 mA, 0-20 mA, 0-5V
1 - 5V, 0 - 10V
Resolution: 15 bits
Accuracy: ±0.05% of span ±0.0025%/ °C
Load Resistance:
0 - 500 ohms (for current output)
10 K ohms minimum (for voltage output)
Output Regulation: 0.01% for full load change
Output Settling Time: 0.1 sec. (stable to 99.9%)
Isolation Breakdown Voltage: 1000 VAC min.
Integral Linearity Error: ±0.005% of span
Temperature Effect: ±0.0025% of span/ °C
Saturation Low: 0 mA (or 0V)
Saturation High: 22.2 mA (or 5.55V, 11.1V min.)
Linear Output Range: 0-22.2mA (0-20mA or 4-20mA)
0-5.55V (0-5V, 1-5V)
0-11.1 V (0-10V)

User Interface
Dual 4-digit LED Displays
Keypad: 4 keys
Programming Port: For automatic setup, calibration and testing
Communication Port: Connection to PC for supervisory control

Control Mode
Output 1: Reverse (heating) or direct (cooling) action
Output 2: PID cooling control, cooling P band 50~300% of PB, dead band -36.0~36.0% of PB
ON-OFF: 0.1-90.0 (°F) hysteresis control (P band = 0)
P or PD: 0-100.0% offset adjustment
PID: Fuzzy Logic modified
Proportional band 0.1~900.0°F
Integral time 0-3600 seconds
Derivative time 0-360.0 seconds
Cycle Time: 0.1-90.0 seconds
Manual Control: Heat (MV1) and Cool (MV2)
Auto-tuning: Cold start and warm start
Failure Mode: Auto-transfer to manual mode while sensor break or A-D converter damage
Ramping Control: 0-900.0°F/minute or
0-900.0°F/hour ramp rate

Digital Filter
Function: First order
Time Constant: 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60 seconds programmable